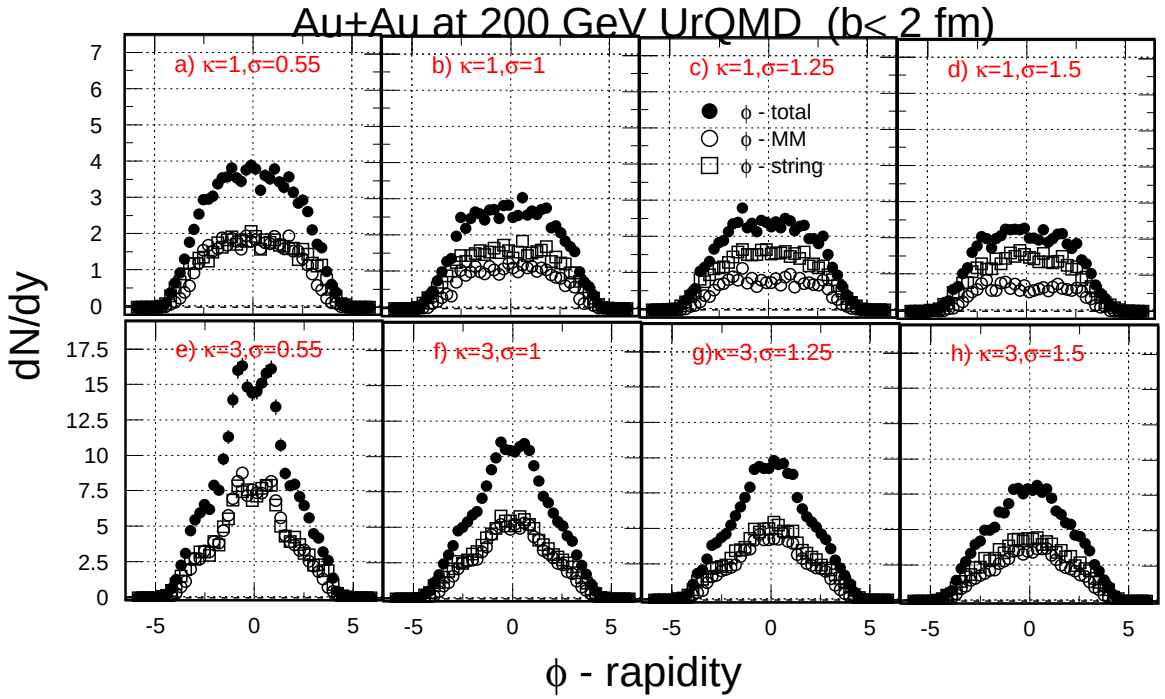
Intrinsic transverse momenta and ϕ-meson production at RHIC

Sven Soff, Srikumar Kesavan, Nu Xu, Jørgen Randrup



We focus on the production of the ϕ-meson in Au+Au collisions at the Relativistic Heavy Ion Collider ($\sqrt{s_{NN}} = 200\,\mathrm{GeV}$). The existence of strong color fields in such massive collisions may lead to strongly enhanced intrinsic transverse momenta, characterized by the width of a Gaussian distribution σ. Moreover, the production of heavier flavors (masses) is increasingly favored, characterized by an enhanced parameter κ, describing the mass production term in the Schwinger formula for particle production. Both values have a strong impact on the double strange ϕ-meson. Fig. 1 shows the rapidity spectra of ϕ-mesons for various combinations of these two quantities as calculated from a microscopic transport model (UrQMD) that is based on (di)quark, string and resonance degrees of freedom. Clearly, strong fields ($\kappa = 3\,\mathrm{GeV/fm}$) lead to an enhanced production of ϕ's. The contributions of ϕ's produced by meson-meson resonant scattering (open circles) and directly produced ϕ's (open squares) are shown separately.

Increasing the transverse momentum broadening parameter σ from its vacuum value 0.55 GeV/c decreases the yield of ϕ-mesons, particularly the contribution from the coalescence channel. Kaons with on the average larger (relative) momenta are less likely to produce a ϕ-meson. The effects of rescatterings of the hadronic decay products of ϕ-mesons are not considered here. The simultaneous measurement of both decay channels (hadronic and dilepton) of ϕ's by PHENIX and STAR will help to disentangle the two production mechanisms and to elucidate the role of strong color fields and intrinsic p_t for high-energetic nucleus-nucleus collisions at RHIC.

References

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[2] S. Soff, talk at the Workshop on *Transverse Dynamics*, Mar 2003, Brookhaven National Lab., Upton, NY.